OCTOBER 1955

Approach

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THE NAVAL AVIATION SAFETY REVIEW

winter issue

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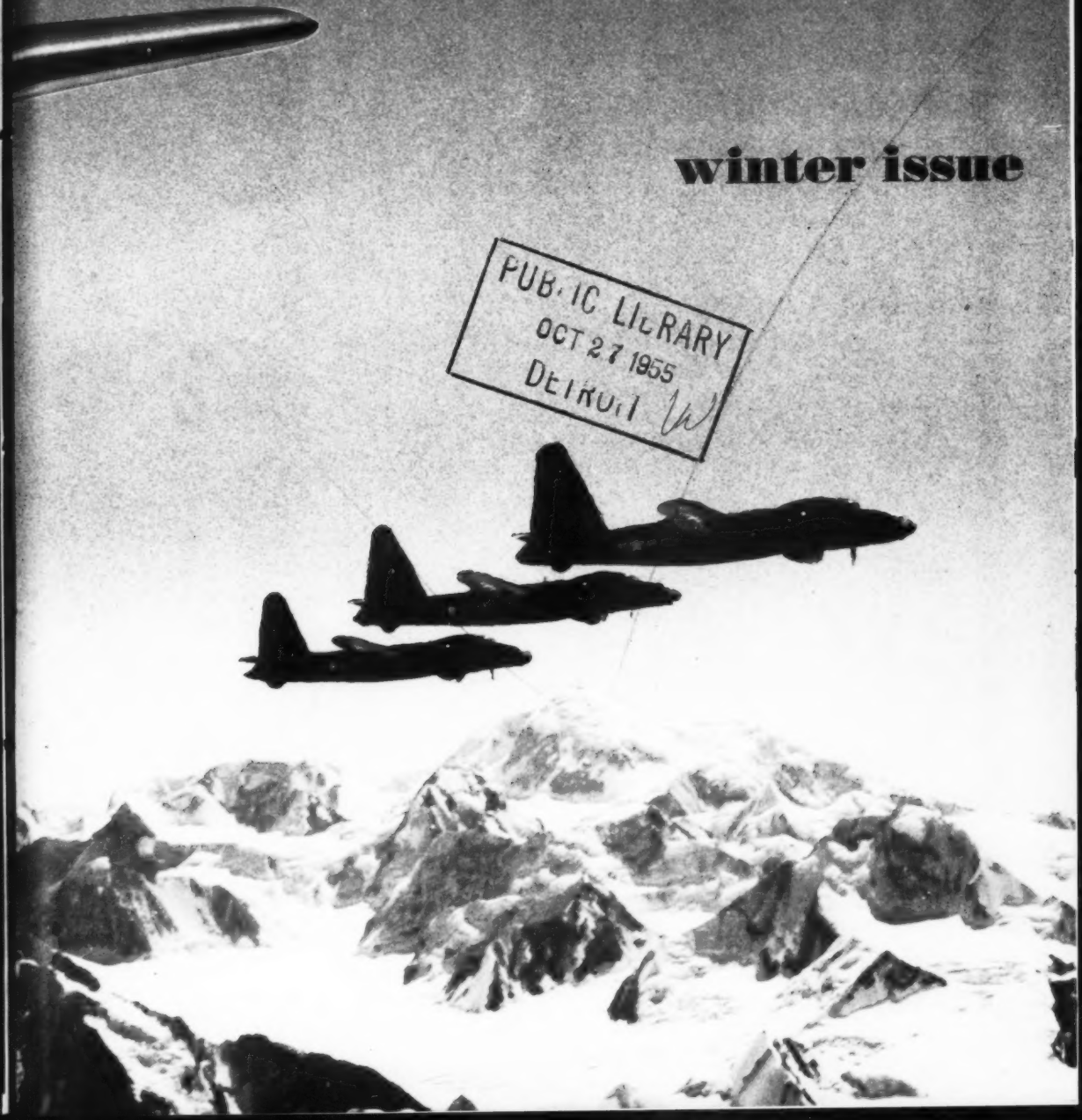

Approach

THE NAVAL AVIATION SAFETY REVIEW

OCTOBER 1955
Vol. 1 No. 4

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When the pinball machine flashes TILT, it's a minor matter—even if you just missed winnin' a new corn-popper. But when the gages in your flying machine indicate TILT, and *you're really on the level*, watch out! To stay on an even keel in the flying game, get a new slant on your gyro horizon in T I L T, page 22.

Prepared by the U.S. Naval Aviation Safety Center

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The printing of this publication has been approved by the Director of the Bureau of the Budget, 9 Dec 1954. This periodical contains the most accurate information currently available on the subject of aviation accident prevention. Contents should not be construed as regulations, orders or directives unless so stated. Material extracted from Aircraft Accident Reports, OpNav Form 3750–1 and Anymouse (anonymous) Reports may not be construed as incriminating under Art. 31, UCMJ. Names used in accident stories are fictitious unless stated otherwise. Photo Credit: Official Navy or as credited. Original articles may be reprinted with permission. Contributions are welcome as are comments and criticisms. Address all correspondence to Director, U. S. Naval Aviation Safety Center, NAS Norfolk 11, Va.

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H. M. MARTIN, Vice Admiral, USN
Commander Air Force, U.S. Pacific Fleet

'Hot Aircraft in Cold Operations'

The winter season reduces the margins of Safety in Flight Operations.

The winter season provides realism in training for Northern Latitude operations.

Winter flying hazards are both in the air and on the ground, water or carrier deck.

Our aircraft of today are designed for high altitudes and the low temperatures found there, but the winter season and high altitudes brings these atmospheric problems down to lower altitudes, sometimes to zero, and reduces the air space available for recovery or correction.

Winter flying adds hazard in takeoff, landing, handling of planes on the deck, preflight checks and postflight procedures because of slippery, icy runways, wings and decks.

"Bundled Up" pilots and mechanics reduce their "Neck Swiveling," hurry inspections and checks to get back to the "Joe Pot," and skip details because it's "too damned cold."

It is your job as operating Commanders, Pilots, Mechs, ground crews to use this fall weather to prepare for cold weather troubles and develop the capacity to operate with safety in spite of them.

H. M. MARTIN

Report on

The Cold War

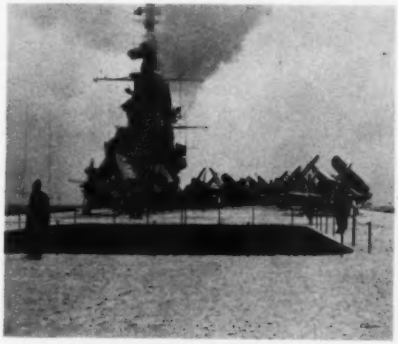
This fictitious account presents problems typical to winter flight operations.

THE lieutenant pulled the readyroom door closed behind him, straining against the cold wind that buffeted along the catwalk passageway. Stepping up the ladder he half-crouched to peer over the guard rail.

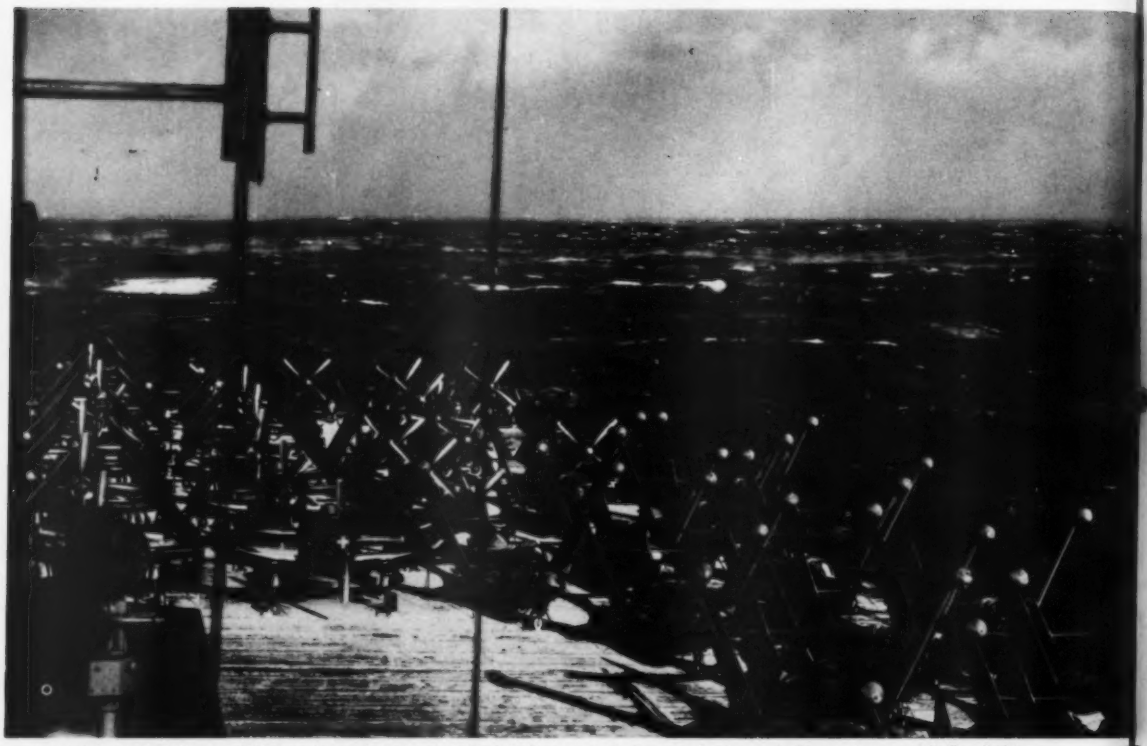
About the carrier a gray-green winter ocean stretched in a disorderly expanse of whitecaps whipped into vapor by a stiff February wind. Frowning at this chilly picture the lieutenant squinted up at a low-hanging mass of clouds that pressed down heavily from a 1200-foot ceiling.

"Ugh!" The lieutenant's opinion was short and impressive. Turning he looked across the flight deck where the bustle of preflight activity was accompanied by the usual thump-clank-shout-whistle noises of people and machines being moved about a restricted space. About the prop aircraft preheater units puffed busily into duct tubes leading to engines, and around several airplanes moved the bulky, winter-clad figures of crewmen swabbing wings with surface de-icing fluid to remove the frosting left by a pre-dawn snow flurry.

Abreast of the island a tractor, with rotary broom attach-



When the Air Ops Officer said: "Cold weather flight operations are scheduled en route to extended deployment," much had to be done by all hands.



The Flight Deck Officer and his men have their hands full with slippery deck, frozen tie downs, balky engines, and bulky clothing.

The Cold War
(*Continued*)

ment buffed away at the light covering on the deck, while scattered groups of crewmen busied themselves at the same task, using a far older shovel and broom system of snow removal.

Flight deck personnel were removing canvas covers from the barrier sheaves and up forward, steam and salt water from the fire hose cleared ice from the catapult track.

"Ugh!", repeated the lieutenant, "Corpus was never like this!" He ducked down the ladder and returned to the warmth of the readyroom to a scene repeated four or five times on the ship. In a general atmosphere of controlled confusion, pilots in every stage of undress struggled into exposure suits and flight gear, in a grumbling chorus of complaint against the unaccustomed tightness of neck and wrist cuffs.

The duty officer orbited in a harassed frenzy between the blackboard and the squawkbox, squirming his way past individuals who rummaged about seat lockers for stray items of gear.

Final flight plan notes were made, charts were re-checked, and information from the teletype screen was recorded on kneepads. Situation normal—until you noticed the low cross-current of comment:

"Me, I never went for these sweatbags. They're not my idea of pure comfort, but I read about a gent . . ."

"With *my* luck, I wouldn't bail out over a open manhole without a Mae West, so I'm willing to suffer a bit for posterity—*my* posterity . . ."

"Man, this is where we separate the a-dults from the joovenile dee-linquents. I'm thinking that mess of instrument training we griped about logging back on the beach is gonna pay off, *real* soon . . ."

"Didja see the water temperature? Cool, man, cool!" . . .

"Did *you* hear that character in Ready Three? He says his outfit didn't get around to

practicing as much GCA as they'd like—got a lot of new people too . . ."

"Uh, huh, plus a very sloppy attitude about letdown procedure and instrument work in general—and they didn't draw poopy bags until the last minute. Probably didn't even get a chance to check them for fit *or* leaks. Real sharp . . ."

In the other readyrooms the pattern was much the same, the tempo of the chatter betraying the underlying excitement of a carrier launch. Elsewhere on the ship were similar indications of a normal pre-launch tenseness increased by the considerations of winter-weather.

The Air Ops Officer: " 'Cold weather flight operations will be scheduled en route to extended deployment,' the Op-Plan says, and cold weather operations we're engaging in! Well, if all the outfits aboard were as well prepared as those in Ready Two, this would be a cinch, but . . ."

The Flight Deck Officer: "Great balls of rime ice! Deck slippery, tie-downs frozen; tractors balky, airplane engines so cold they'll probably cave in the power units when we start engines—and that respot after the recovery. Remember, stupid? You turned down staff duty for this tour! Ah, well, if those throttle jockeys will just take it easy and not blow my men over the fantail . . ."

The Catapult Officer: "That's that. Everything checks. Better tell the men again about attaching those stiff holdbacks without collecting a fistfull of busted fingers. Looks like the old boat will ride this sea pretty well. Now if this was the old Shipley Maru—I'd probably have to fire 'em off with a 'up periscope' signal, the way that old bucket pitched in a rough sea . . ."

The Air Officer: "Whooie, look at the way things have slowed down on the flight deck since we operated down south! And that's just what it's going to take. Slow and easy is the word for this exercise—or we got troubles. Okay, it's about that time. Pass the word for pilots to man planes . . ."

Back in the readyrooms the sporadic chattering of the teletype picked up again, with the customary "EEEEEEE", and then "Pilots Man Planes."

As the first plane booms down the catapult track, the pilot, hardhat thrust back against the headrest, takes time to marvel briefly at the mental picture of this launching of airplanes over a lead-colored, froth-whipped ocean. And just before settling down to the business of getting the mission accomplished he might recall the warm, bright readyrooms of the squadrons ashore.

Warm? Bright shore bases? At precisely that moment . . .

In dozens, scores of readyrooms in ConUS, in Alaska, Newfoundland, Japan — all over—there is repeated, with suitable variation but essentially similar, flight operations scenes which all have one thing in common: Old Man Winter.

Operations officers worry

Whether you can go—and come back safely—in winter operations, is largely dependent on your advance training and preparedness.

The coming of winter brings problems to air stations as formidable as those facing carriers.

over training schedules, maintenance personnel growl frostily at balky equipment, flight leaders chew pencils thoughtfully over planning tables, and wingmen frown a little nervously as they watch the progress of a GCA approach against a low ceiling that merges with a snow-covered air station.

The fictitious account offered here presents a winter flight operations situation which can reasonably occur in a majority of those areas where naval aviation is found. The end of the story, or the outcome of any similar situation depends upon the ability of the individuals involved. In short, you can write your own ending. And right now you are in a position to control the outcome of any situation which *you* might get into this winter.

Skeptical? Listen.

From Adak to Atlantic City, from K-3 to Columbus, yep, from Whidbey to Whiting, the coming of winter will bring problems of flight operations that will be *your* responsibilty to solve. Whether you're faced with a RON from Kingsville to Quonset or the MATS run to Elmendorf, brother, there will be some changes made—in your normal preparations.

Just suppose your outfit's deployment schedule rudely transplants you from Jax to points north—operations on the way—hmmmm? Or maybe you're to take a plane up to Glenview during the season when folks go out and kick their useless sundials into the nearest snowdrift.

Do *you* know how to find a non-icing level when you've acquired a heavy load of that stuff you cool beer with? Got any fast answers for when your radio equipment goes on the fritz and leaves you sort of speechless in a holding pattern, IFR? Have you *really* got the word on the cold weather starting of that engine which is to haul you around the countryside? And just how do you propose to go about stopping that expensive contraption when you set it down on a wet runway? Brakes? Flaps? Drag your feet?

If by now we've managed to get through to you, stay with us for a few more lines. It's just possible that you'll be so glad you did!

Last winter the Aviation Safety Center prepared a special Winter Operations issue of the *Naval Aviation Safety Bulletin.* A sort of cold weather comprehensive, that issue contained a cross-section of information aimed at helping you in your winter preparation problems.

Again we offer a special package of good dope collected from a large number of sources and presented as a companion piece to the earlier review. Obviously the many aspects of winter operations cannot be covered in a single publication. Specific instructions, directives and reference manuals are available to pilots, maintenance and station personnel. *Many of these are listed on the back cover of this issue.*

This limited compilation is offered primarily as an indication of the many answers which are literally at your fingertips and to prompt you to take advantage of the information which can make winter flight operations a breeze.

Now take another look at yourself and your outfit, and be sure that when winter comes, you can go—and come back. ●

Flight Operations

The wise pilot—and squadron—will prepare in advance against the problems of winter flight operations.

FOR Mister Average Aviator, little imagination will be required to place himself in the fictitious situations described previously in "The Cold War." The wise pilot will prepare, in advance, against such winter flight operation situations by screening all information available. For a review let's note a few of the items which will enlarge your store of winter flying dope, and indicate the scope and complexity of winter preparations necessary.

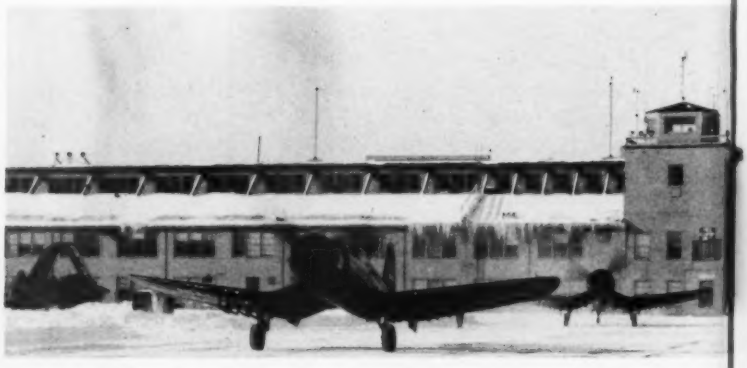
Weather

Preflight planning must incorporate special attention to weather factors, ranging from a thorough briefing of local, en route and destination conditions, to the specialized conditions peculiar to given areas. For example, the phenomena of ice fog, though encountered mostly in the far north at very low temperatures, is a perplexing problem still under research.

Differing from ordinary fog in that its particles are composed mostly of suspended ice crystals rather than water droplets, ice fog is a man-made phenomenon resulting from contamination of the atmosphere by water vapor released from smoke and engine exhausts. It is usually found in areas near cities and air stations, where it drifts out over runways and is usually concentrated there in patches to heights of a few hundred feet.

From the air it looks pretty

Cold Weather



Personal preparedness is as important as aircraft readiness for successful winter ops.

harmless, you can see down through it, but quite often the visibility on your approach, can drop to a few hundred feet or less and the maintaining of directional control becomes very difficult. Add to this the problem of "white-out," where a lost horizon results when low cloud or snow showers merge with a snow-covered ground, and you're in trouble. Answer: Get on the gages, fast, get up fast, and stay on instruments, and if you must land in a white-out, use a gradual, power-on approach, plus extreme care.

Other phenomena peculiar to cold winters, such as inversions which often exist at about 5000 to 10,000 feet, and blowing snow, are covered in detail in aerology publications easily available. Pilots should be aware that, while forecasts are generally excellent, certain areas may lack sufficient reporting stations to provide information on specific local conditions. Count this in your planning and anticipate possible changes of your plan.

Preflight

Once you have completed your preflight planning, you should allow for a preflight check which must include certain items in addition to those required in temperate or warm climate. Just for example:

Check the landing gear mechanism for icing, and all hydraulic and air lines for cracks, breaks or leaks.

Inspect fuel tank vents for icing.

Check hinges of all control surfaces for no particles of ice or hard snow to cause jamming.

Make sure *all* ice and snow have been removed from aircraft (see maintenance section of this issue for procedures).

Test all main and auxiliary controls for freedom of movement.

Check all emergency equipment for completeness and proper stowage.

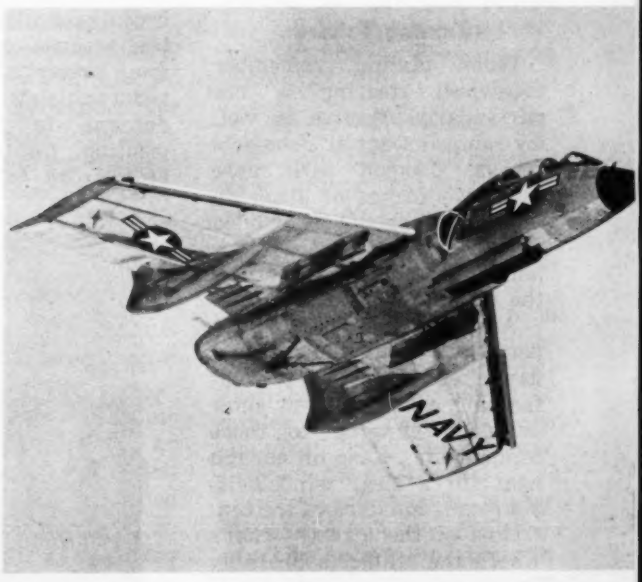
In extremely cold conditions, the radio compass loop may require warming before it will operate in the auto position.

Check the oxygen system against possibility that filling within a hangar space followed by removal to outside temperatures may have cooled and contracted the oxygen, thereby reducing the amount available.

Check operation of all duct doors, and cooler doors.

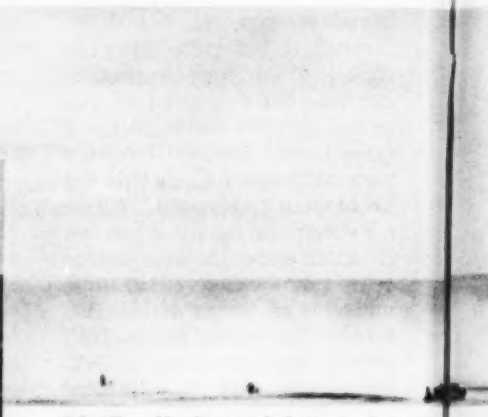
Starting procedures may vary with the model aircraft,

Operations



After taking off from slush covered runways, it's wise to cycle landing gear to prevent freeze-up.

Nosewheel steering is not very effective on wet, icy ramps except at slooo-oow speeds.



Takeoffs and landings on slush, snow or ice-covered runways

and a thorough understanding of the techniques required for your airplane will make for a proper start now, and insure less trouble later.

Taxiing, Takeoff

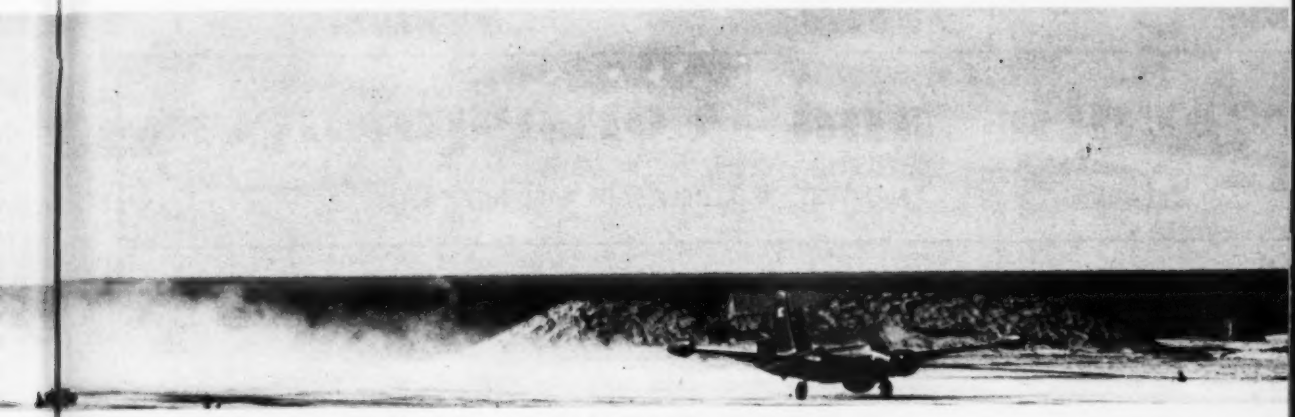
When taxiing, remember nosewheel steering is not particularly effective on wet, icy ramps except at *slooo-oow* speeds. Takeoff with more than two inches of slush on the runway should be avoided as there is a danger of the landing gear freezing in either the up or down position.

After takeoff, when safety permits, a cycling of gear and flaps will help to prevent freezing caused by wet snow or slush clinging to those components. Keep on enough heat for a clear windshield. En route, don't crowd the centerline of the airway—that's where the traffic is probably the heaviest in weather. If weather ahead is bad, review your plan of action, and have everything organized before things start to happen fast.

Radio transmissions may become completely unintelligible because of interference from precipitation static. To reduce this static, use the loop antenna in the maximum position. *Caution: This procedure can be used for long range flying but must not be used for radio range letdown.* Don't attempt to hold in bad icing or bad turbulence, do something about it. Use radar for all it's worth, the man on the ground is a good backer upper and he wants to be of service. Have the right speed values in mind for your load. Having flown through icing conditions, consider the effect on your airfoils and carry a little speed margin for unpredicted stall speeds.

On letting down, take precautions against the wing-

Before letdowns through clouds prepare for icing, windshield fogging, and excessive engine cooling. (Below) When fog, low clouds or snow showers merge with a snow-covered ground you're in real trouble.



...nways like other winter flight operations require special attention and techniques which are discussed here.

shield fogging; have de-icing equipment going and everything all warmed up before descent through clouds. Remember when throttle openings are reduced, exposure to carburetor icing goes up fast. Lower power descents in clouds and precipitation should always be made with carburetor heat on. Engine temperatures should be maintained during descent to avert possible loss of power during landing.

Landing

In landing, remember that wet or icy runways must be longer than dry runways. Sounds simple, yes, but the overruns will be well populated this winter unless pilots subscribe to this axiom.

When landing on clean snow, difficulty in judging height will be experienced. Hence, height should be judged by reference to objects such as trees, fences, hangars or other aircraft and the approach should be deliberate, gradual, with power on until contact is made. Use brakes judiciously and in good time. If there is any probability of overshooting, take a wave-off.

The NACA has the following to say on brakes and stopping aircraft. "The technique of handling the airplane determines the extent to which the capacity of the wheel brakes can be utilized. Raising the elevators immediately after the nosewheel touches the ground may reduce the stopping distances by as much as 10 percent on wet concrete runways and on icy surfaces.

"Instant flap retraction on ground contact may give an additional reduction in stopping distances of about 25 percent on a dry concrete runway, and of 30 percent on a wet concrete runway.

"Flap retraction on icy surfaces would yield little or no reduction in stopping distances beyond that obtained with the raised elevators."

(For wet runway landing techniques, see January/February 1955 *Aviation Safety Bulletin.*)

Returning to the line, approach the ramps with caution. Brakes aren't much help on slippery pavement. If ramp or taxi markings are obliterated and you're working in close quarters, keep a particularly cautious lookout. If you can't see the markings, assume the guy who parked the other airplanes probably couldn't either. They may be out of position.

Shutdown Procedure

Shutdown procedure may vary among various model airplanes, so know *your* procedure and make sure that the *next* pilot will have everything in his favor.

Admittedly, this review is necessarily limited, and pilots are advised that specific discussions of the problems of winter flight operations are contained in the references listed on the back cover.

Get the answers to winter operations now, you probably won't be able to find them in the cockpit later! ●

Truth and Consequences

A DIGEST OF RECENT AIRCRAFT ACCIDENTS

VA

AD

VERTIGO—A first tour pilot with 224 hours in ADs departed IFR from a West Coast air station. The pilot had completed All-Weather Flight School and had 60.1 hours of simulated and 4.5 hours of actual instrument time. ATC clearance involved a climbout over water on a magnetic heading with a 180-degree course change at 6000 feet.

After crossing a designated range leg at 1500 feet the pilot commenced climbing at 150 knots and 800 feet per minute. Several cloud layers were present with occasional breaks giving views of the water.

At 5000 feet a climbing standard rate turn was begun. The pilot stated he was aware of the effects of flying half visual and half on instruments from a previous actual instrument letdown, but at that point his troubles began. He found he was 40 degrees past heading, leveled his wings, then put the aircraft into a slight climbing turn to return to correct heading.

Instruments showed the nose of the plane coming up and airspeed dropping to about 110-120 knots. The pilot reports he was shifting between visual flight and instruments and becoming disoriented. Believing he had eased the nose down, the gyro-horizon tumbled and the pilot went immediately to partial panel. The aircraft assumed various attitudes and at one point the pilot thought he was on his back and tried to pull through in a recovery. He was still shifting from instruments to visual and definitely experiencing vertigo. After broadcasting a Mayday with intentions to bail out the pilot thought he was in a flat spin and attempted a recovery. At that point his Mayday was acknowledged and he left the aircraft. Altitude was then between 1500 and 2000 feet.

The pilot was in the water only a short time before being spotted and picked up, but reports his lack of a life vest caused some difficulty in staying afloat until entry into his pararaft.

The accident board concluded that, (a) unsatisfactory instrument technique was employed, with each recovery attempt a combination of trying to see a visual horizon plus a quick scan of instruments, (b) the pilot may have been overconfident due to an actual GCA approach four days earlier. It was recommended that pilots continually be aware of their own ability and recognize the dangers of "half and half" flying under IFR conditions.

AD

CLOSE SHAVE—On his eighth night road reconnaissance training mission and while at 500 feet altitude the pilot was suddenly blinded and disoriented by a white light from outside his cockpit. He attempted to remain in visual contact and pushed the nose over. When the ground appeared uncomfortably close the pilot rapidly initiated a pull-up. Sparks were observed by the wingman and upon examination after a safe landing at the base, the aircraft

With a FULL LOAD, altitude could not be maintained by this ditched Beech with one engine gone. Prompt rescue averted disaster.

was found to have sustained minor damage to the tail section and radome.

Analysis indicated the AD-4N struck the ground in at least a three-point attitude with the force of the impact slight. Another few inches of descent would undoubtedly have forced the propeller into the ground. As noted on the AAR endorsement the survival of the pilot and his aircraft borders on the miraculous.

Squadron syllabus prescribed 1000 feet minimum altitude for subject type flights and the accident board recommended that increased emphasis be placed on the necessity for maintaining optimum altitudes during conditions of reduced visibility. Also stressed was the necessity for reverting to instrument flight when encountering outside illumination under these conditions.

NAS

SNB

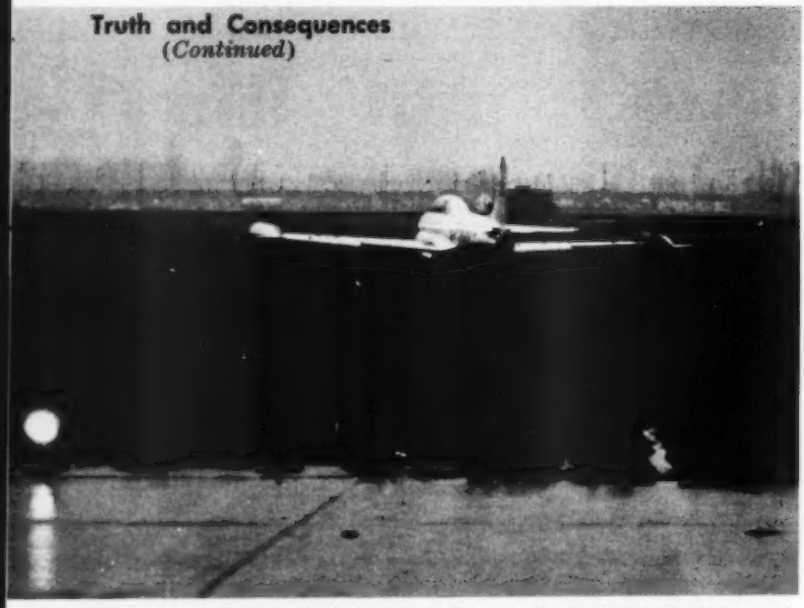
FULL LOAD — Seven minutes after takeoff in an SNB-5 the port engine failed completely and without warning. At the time the aircraft was at 2000 feet, six miles from the field. Gas fumes precluded an engine restart. Full power was applied to the good engine and 100 knots airspeed maintained. At the gross weight involved, full load of fuel plus six occupants, 100 knots airspeed forced a rate of descent of 300 feet per minute.

Upon return to the field a left-hand approach was set up and 20 degrees flaps lowered. Turning on final wheels were lowered which caused the aircraft to mush rapidly and roll to the left. As the field could not be made, wheels were retracted, wings leveled and a smooth water landing was made 500 yards short of the runway. Crash boats rescued all personnel and no injuries were sustained.

The accident board recommended that commands operating the JRB/SNB give serious thought to checking new and unfamiliar pilots on emergency procedures under adverse conditions of weight rather than under the most ideal conditions. That ideal conditions will not adequately prepare a pilot for the shock of losing an engine on takeoff at or near maximum allowable gross weight for his aircraft.

Additionally, the board recommended that qualified pilots demonstrate to a check pilot their proficiency in single engine operation under heavy load conditions at least quarterly, much as they would demonstrate their instrument proficiency.

Truth and Consequences
(Continued)



An experienced pilot forced his luck in marginal weather, landing HOT AND LONG in mud.

NAS

TV

HOT AND LONG—The TV-2 executed a missed approach on the initial range letdown and was transferred to GCA control. Weather had deteriorated to 700 feet overcast with one mile visibility in light drizzle and fog. About one hour's fuel remained with 22 minutes required to proceed to the alternate. Both pilots in the TV-2 were considered experienced and extremely capable.

No target could be picked up on the final controller's precision radar and a PPI approach was executed on final. The aircraft was indicating 140 knots on final in the landing condition and though the pilot chopped all power upon sighting the field, the aircraft was high and/or fast and touchdown was made midway down the 8000-foot wet runway. It continued off the end of the runway for 264 feet in soft mud.

It was considered that the primary cause was the pilot's failure to execute a wave-off for another controlled approach or to proceed to the alternate. The board further said that this appeared to be a case of an experienced pilot trying to force his luck in marginal weather.

AD

TIMBER!—An AD-5N was on a practice night GCA final approach and the conversation went like this:

"On glide path . . . Over end of runway . . . Standby for touchdown . . . Over touchdown . . . When you have completed your rollout you are cleared to tower frequency."

"This is aircraft 14, I've got news for you. *You put me in the trees!*"

The surprise for both GCA and the pilot in this accident was understandable. The pilot was experienced and considered skillful and held a special instrument rating. The final controller was fully qualified and had successfully completed 24 GCA approaches during the previous two weeks.

With ceiling reported 1800 feet and visibility two miles in light rain and fog the approach was normal until the controller lost the target in rain and tree return about two miles from the end of the runway. The pilot was advised of this and instructed to maintain 370 feet. His APN-1 radio altimeter was on high scale with the warning light on continuously during final.

Target was regained in a few moments and the pilot was told he was on glide path and that the outside observer had him in sight. After recommencing his standard rate descent and about 1600 feet short of the GCA touchdown point, the aircraft struck and broke off the tops of several small trees which varied in height from 12 to 20 feet, sheared four telephone lines and went through the station boundary fence. Initial touchdown was short of the runway and 1361 feet short of GCA touchdown point. Power was added and the aircraft became airborne again. A normal landing was made on the runway.

Investigation revealed that

after beginning his standard rate descent from the assigned altitude of 370 feet the pilot had not checked either altimeter available until he felt impact with the trees. He depended almost completely on the final controller for elevation.

Analysis indicated that the final controller evidently lost the aircraft in elevation return a second time during final and failed to advise the pilot of this fact, relying on the outside observer, to keep him in elevation. However the outside observer, stationed 3600 feet upwind from the approach end of the runway, had little depth perception under the circumstances and could not judge the aircraft's altitude.

It was recommended that all pilots be instructed in the proper use of the radio and radar altimeters during low ceiling visibility approaches. Further, that pilots be reminded that even though they are making a precision approach under control the safety of the aircraft rests with the pilot.

VF

F9F

During a night familiarization flight two student pilots in F9F-5s collided at about 1500 feet. One airplane went into a nose-low left turn and when the pilot found he could not control it he immediately ejected at an altitude of 1000 feet or below. He landed safely in a tree and was picked up by a helicopter.

The second pilot was able to regain control of his plane so he climbed to 10,000 feet where he slowed to test the stall characteristics. At 250 knots the airplane snapped to the right and began to spin so the pilot successfully ejected at 9000 feet. He was also picked up by a helicopter.

One was committed immediately to action. The speed and efficiency with which he prepared for, and ejected, proved his complete control of positive thinking and knowledge of the procedures in abandoning his disabled plane. The second, having more time, followed the correct procedure for testing his plane by taking it to a safe altitude. Here too, unable to control the plane at slow speed the pilot was committed to eject, and did so without mishap.

Without question both men owe their lives and escape without injury to proper training and equipment.

F2H

OVERSTRESS — Following completion of several day rocket runs and two bombing runs in an F2H, the pilot made normal entry into his third bomb run from about 10,000 feet. The 60-degree dive progressed normally until pilot was midway through dive recovery, which was begun at about 3500 feet. During what was supposed to be a steady 4 G pullout, the aircraft suddenly, entered a high rate of climb, rising to about 6000 feet, falling through to an inverted position, then recovering to level flight. On advice from observer orbiting over target in another aircraft who verified the above pilot-described maneuver, plane was flown to 10,000 feet and checked by a wingman. Aircraft appeared okay, so a straight-in approach was made to a normal landing. The accelerometer showed 12.4 G.

The aircraft sustained damage which included rivets cocked and pulled along upper and lower center section of both wings, buckled center sections, flaps bent, and other miscellaneous damage.

In view of two previous similar actions, the accident board called in assistance from BAR St. Louis and ComAirLant. Investigation covered three possibilities. 1) Pilot error or technique 2) material failure, and 3) design deficiencies. The latter two were subsequently determined not contributing factors.

The following factors indicate pilot error. When the factors of the pilot's bombing run were applied to Figure 1, BuAer Technical Note 2-50 an anticipated load factor of 6.5 G was indicated during the pullout. The board was of the opinion that previous runs were executed flawlessly and at a slightly higher release altitude. In the dive in question, slightly rougher technique, coupled with the possibility of some turbulence or rough air, aggravated the dive load.

It was recommended that pilots review the Vn diagram, and that a wider margin of safety be required to compensate for the inexperience and lack of technique of the newer pilots, despite deployment urgencies.

Truth and Consequences
(Continued)

VP

P5M

OPEN SEA DITCHING — After 10½ hours of a transpacific flight in a P5M-1 a failure occurred in the starboard engine as evidenced by (1) a continuing series of loud reports resembling backfiring (2) a loss of power with the aircraft swerving to starboard and (3) a fire warning indication in the power section of the engine. The copilot was flying at the time.

When the failure indication occurred the pilot, after observing the fire detector light, immediately feathered the starboard propeller and secured the engine. All members of the crew immediately donned parachute harness.

At the time of the engine failure the aircraft weighed about 64,000 pounds. The pilot was unable to maintain 8000 feet on single-engine operation and a gradual descent was started, meanwhile putting the jettisoning bill into effect. No fuel was jettisoned nor were the bomb-bay tanks. Power settings required to maintain single-engine at 1800 feet were 2600 rpm and 45" MP.

After 50 minutes of single-engine flight the gas turbine power unit failed. The plane captain on his own authority stationed the jettisoning party at ditching stations. A subsequent order to the crew from the pilot to ditching stations was apparently heard only by the navigator, copilot and radioman. The radioman remained at the panel sending out ditching reports. About 30 seconds after the gasoline power unit failed, there were extreme fluctuations of the port engine fuel flow and torque pressure indicators, port engine failure followed. The crew was ordered to bail out. However, because ICS power was lost this order was heard only by the copilot.

With no trim control except elevator, no flaps, and the aircraft badly out of trim a rate of descent of about 1500 feet-per-minute and 105 knots was established. The port feathering button was actuated thus losing all source of AC power and the use of spoiler ailerons, wing flaps, flight boost to rudder and elevator, and instrument lighting. In this manner a dead-stick night sea ditching was accomplished. The first impact was severe and was followed by a high bounce. On second impact the aircraft broke up and the controls gave way. The flight deck section hit with a forward sliding motion and rolled over. Surviving the ditching were the pilot (pilot's seat), copilot (who bailed out at 900 feet), plane captain (stowage compartment), radioman (panel) and third pilot (crash bulkhead). The third pilot died later of injuries while in the water. None of the survivors saw the other crewmembers again who had been stationed at the crash bulkhead. These included the 2nd mech, 2nd radioman and radar technician.

The aircraft accident board attributed the primary cause of the accident to the pilot for permitting the port service tank to run dry. It was recommended that:

1. A careful review of the ditching stations in the P5M-1 aircraft be made, bearing in mind that the four crewmen seated at the principal crash bulkhead were the ones who did not survive the ditching.

2. Consideration be given to the employment of every flight deck seat for ditching stations, in which event they should all be strengthened.

3. Squadron doctrine requiring a man to wear a head-

This OPEN SEA DITCHING followed poor single-engine emergency techniques.

set continuously at the scene of action be established.

4. Addition to the single engine check-off list of the following items:

a. If at all possible scan instruments before feathering bad engine.
b. Operation of fuel cross-feed system.
c. Fuel and oil levels maximum in service tanks.
d. Turn on all hydraulic pumps until all AC busses are energized and emergency is over.

This accident points out several important lessons to be learned. When the aircraft is below single-engine weight, a descent to lower altitude will greatly facilitate single-engine operation. Specifically in this case it would have been more to the point had the plane captain spent his time in fuel transfer instead of jettisoning.

In P5M aircraft the pilots are directly responsible for the transfer of fuel and must at all times be cognizant of their fuel loading, even though this duty is physically delegated. All P5M pilots must be familiar with the fuel consumption of the R-3350 engine.

A training program should be conducted on fuel consumption during single-engine operation when operating at maximum continuous power settings. The pilot in this case might well have jettisoned the bomb-bay tanks. When using the emergency bomb salvo system the bomb-bay doors open, tanks drop and the doors close automatically. Their reported operation is completed in 5 to 7 seconds with no loss of airspeed. It was also noted that the decision to feather an engine must be weighed against the possibility of operation at reduced power.

Poor rollout technique brought trouble on a SINGLE ENGINE landing.

P2V

SINGLE ENGINE—While cruising at 900 feet over water the starboard engine of a P2V lost power and the pilot elected to land at the nearest field 21 miles distant. The field selected had a 4000-foot runway available. Alternate fields were over water flights of 40 and 55 miles but had 6000-foot runways.

Due to turbulence, touchdown was not accomplished until 1500 feet from the approach end of the runway. A port swerve developed from brief use of port reverse pitch. Right brake and rudder were unable to correct it. The excessive weight and stress placed on the nosewheel resulted in a loss of the nosewheel tire.

With only the right main mount remaining on the runway the aircraft straightened and continued parallel to the runway. The nosewheel collapsed and the plane slid on its nose for 165 feet.

Investigation disclosed that a crosswind from the left with gusts up to 22 knots established a tendency for the aircraft to weathercock and that even brief and limited use of reverse pitch aggravated the left swerve. Attempts to steer the nosewheel to the right resulted in the tire being thrown from the rim and subsequent collapsing of the nose gear.

The board recommended that all plane commanders be made fully cognizant of the capabilities of the P2V model aircraft as to its ability to operate on single engine. Additionally it was recommended that all pilots be cautioned to make maximum use of brakes and nosewheel steering while on the runway after single engine landings. If the aircraft leaves the runway nosewheel steering should be used with caution as failure of the nosewheel may ensue.

Truth and Consequences
(Continued)

When a skid developed during the rollout this P4Y ended up on the COLD SHOULDER

VP

P4Y

COLD SHOULDER—Upon returning to his base the pilot of a P4Y-2B began a practice GCA run with a 26-knot, 90-degree crosswind. Though snow and ice existed on the runway the pilot requested no information concerning braking action nor did the tower volunteer any. At about 400 feet the pilot took over visually, passed over the approach end the runway slightly high and touched down at 85 knots 1800 feet down the runway.

During the last half of the rollout a skid to the right occurred with the plane maintaining heading down the runway. On the last third of the runway the aircraft hit a three-foot high snowbank which extended out on the runway for 75 feet. Due to a high area in the runway it was not visible during the approach.

The nosewheel snapped from the stress imposed by travel through the drift and the plane swerved and came to rest 90 degrees to the runway.

In the analysis by the accident board error was indicated on the part of the pilot and also by ground personnel.

(a) Just prior to the accident a pilot landed and advised the tower that braking action was poor to nil. Pilot of the P4Y-2B, overhearing the advisory message and expecting poor braking action, did not plan his approach to touch down eariler or proceed to several available alternates.

(b) The aircraft accident board was of the opinion that station personnel erred in not making a more determined effort to expedite snow removal on the runway in use. The snow bank in question was known to extend 75 feet onto the runway for a length of 1900 feet.

(c) Snow removal equipment was at work on a shorter runway closer into the wind which was available upon request.

(d) The most recent snowfall had occurred two days earlier. A terminal forecast issued the day before the accident had warned of the wind shift.

It was noted that the runway most nearly into the wind had been used least and cleaned least during the season due to its short length. It eventually froze making snow removal difficult. Removal had been attempted as late as the morning of the accident but was discontinued due to equipment being damaged by ice patches.

(e) Overcast conditions made visual observations of the contrast between the snowbank and the ice extremely difficult from the air. *Editor's note: The accident investigation brought out no mention of visual runway or snow obstruction markings. The value of such markings in winter operations is discussed in "Snow Job"* page 41.

(f) Tower personnel erred in not informing the pilot of existing hazards and in not automatically advising of reported poor braking action.

Accident board recommendations included the fact that

NOTAMs warning "Caution" with a very general description of conditions do not give a pilot sufficient amount of information to allow complete planning of his approach and landing. Nevertheless, it is each pilot's responsibility to determine the condition of the runway on every landing, particularly in areas where severe winter conditions exist and can be expected.

VS

S2F

WRONG FEATHER—A normal takeoff was commenced after a successful day FCLP landing in an S2F-1. Becoming airborne the pilot made a clearing turn to the left at which time he noticed a considerable lack of power. The LSO noted that the port propeller appeared to be windmilling, however the pilot stated that he was under the impression that he had lost his starboard engine. Without checking either engine instruments or warning lights he feathered his starboard engine.

Witnesses reported that the wings were leveled and it appeared the pilot had good control when the aircraft seemed to lose all power. The aircraft nosed down and landed, gear extended, in a grassy area off the runway. The landing gear sustained the shock of the touchdown and rollout was normal until the aircraft struck a drainage ditch. It rolled on its lateral axis and came to rest on its back. Minor injury was sustained by the pilot and serious injury by the copilot.

In its analysis the accident board noted that in some types of aircraft it is extremely important that feathering action be taken immediately to prevent an accident, especially at low altitudes and air speeds. However the time involved in checking the engine instruments and warning lights is so short that the board felt the pilot acted with undue haste. This is especially true in the S2F-1 which has excellent single-engine characteristics. It was felt that sufficient power can be developed on one engine to enable the pilot to effect a safe landing even though the other propeller is windmilling.

It was recommended that all pilots engaging in FCLP in the S2F be thoroughly familiar with and periodically review the single-engine characteristics of the aircraft. It was also noted that the primary consideration in a power failure emergency is control of the aircraft. Corrective action should not be attempted until it is definitely determined which of the engines is malfunctioning. ●

Without checking either instruments or lights, the pilot made a WRONG FEATHER.

Anymouse

and his hairy tales

JUST PLAIN LUCK

An R4D-6 was cleared IFR from San Diego to Dallas with en route weather mostly VFR. Severe turbulence was encountered over Arizona and New Mexico and Anymouse used numerous power changes in attempts to maintain his assigned altitude. Fuel consumption was considerably increased but when passing Abilene, Anymouse said, "We can make Dallas but it will be close."

By sunset the weather was generally clear with scattered thunderstorms and the low frequency equipment was useless most of the time. After being airborne approximately six and one-half hours a check of the fuel gave the best estimate of about 20 minutes flight left. There were no landing fields visible and both Anymouse and his copilot were disoriented.

Anymouse had the plane captain pass the word for all passengers to put on parachutes and stand by to bail out. At that time a beacon light was sighted and a radio conversation established it as a field 80 airways miles short of the aircraft's destination. Anymouse elected to land but missed his first approach. After a wave-off the aircraft touched down safely on the second pass.

A very shaky crew chief told the very shaken passengers that a check of the fuel revealed less than 15 gallons.

ICE TROUBLE

It was mid-December when the P5M started down to the Gulf Coast and sunny weather. The first leg of the flight was VFR at 6000 feet but soon a deck of stratus clouds were encountered and an IFR clearance was required. Shortly after going IFR light rime ice was noticed

On a routine IFR cross-country in his trusty P5M, Anymouse suddenly developed a load of ICE TROUBLE.

and de-icers were turned on. Then an area of freezing rain was entered and 4000 feet was requested due to serious icing. The wing boots were clearing considerable amounts of ice but due to the increased weight additional power was necessary to hold 125 knots.

Clearance for 4000 feet was delayed due to ATC communication difficulties. The aircraft was unable to maintain 6000 feet and was approaching a stall at 124 knots. At this time a serious gas leak developed with strong fumes present and

the aircraft made an off-airways high rate descent.

Breaking out at 3800 feet Anymouse canceled his IFR clearance and refiled VFR to a coastal seadrome. When the windshield cleared, "six to eight inches of ice was observed on the wipers."

After landing and breathing a "big fat sigh of relief," Anymouse reminisced on his hairy experience and said, "We should not have used our de-icers until the ice had built up to a greater extent, but our worst mistake was in not declaring an emergency when we were unable to maintain our assigned altitude."

FREEZE PLAY

Ground temperature was 20° F. and it had rained heavily the day before. The AF-2W started normally using APU and warm-up was slow but sure. Anymouse takes up the tale from there.

"I called for taxi and altimeter setting," he said, "and cranked it in. The altimeter read 500 feet off field elevation and I noted the correction when I reset it.

"I taxied out, ran up and took off. Instruments were scanned immediately after becoming airborne. The airspeed registered 150 knots. Altimeter was 100 feet below field elevation and the rate of climb read 1000 feet per minute *down*! My quick scan became a stare and when the airspeed moved back to 50 knots I had already started back to the field. My estimated speed on final was 120.

"It was a simple case of the static pressure vent hole being frozen solid. I had a heart to heart talk to the stupid pilot who'd crank in a 500-foot error into his altimeter without further question. And, to think that this flight could have been a night cat shot..."

FLASH FIRE

Waiting for mid-air refueling Anymouse heard the tanker pilot say not to plug in until the drogue was streamed properly.

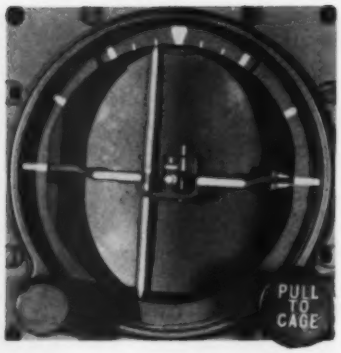
"I watched the hose being streamed," said Anymouse, "and the tanker pilot said, 'Okay, I can give you 1300 pounds.' Instead of waiting for the specific correct procedure words of, 'ready for contact', I called, 'Making my pass' and plugged in.

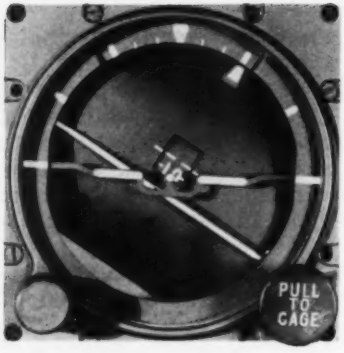
"The refueler system brake was on and my forward motion caused a loop in the hose. The hose whipped around and snapped off leaving the drogue stuck on my fueling probe. I immediately pulled away and checked my engine instruments.

"The tremendous splash of fuel that went all over my plane when the hose broke was ignited abaft the plane in a big flash of fire and smoke. Other people in the air at the time thought that I had exploded. However, I had no damage but had to return to the carrier and land aboard with the drogue stuck on the probe.

"It had no effect on landing or approach characteristics of the F2H-3 but fuel consumption was increased. In a similar situation I would immediately head for the ship or a diversionary field because of the increased fuel usage." ●

A hairy FLASH FIRE enveloped the *Banshee* when Anymouse jumped the gun on a refueling hook-up.





TILT!

Accidents indicate that pilots are not completely familiar with inherent errors in the gyro-horizon during certain common tactical maneuvers . . .

CIRCUMSTANCES of several recent fatal aircraft accidents, in which some form of tactical aerobatic maneuver such as the half-Cuban-eight was involved, indicate that pilots may not be completely familiar with the inherent error of the gyro-horizon instrument used in these maneuvers.

Present day high performance aircraft have boosted lateral and longitudinal acceleration to such peaks that serious turn errors can result from gyro-horizon indicators. These errors may be as much as 15 degrees from the true attitude of the aircraft. The error is inherent to the mechanism and quite often, gyro-horizon indicators are squawked and turned in for overhaul because of "large precession" errors when in reality the instrument was functioning normally.

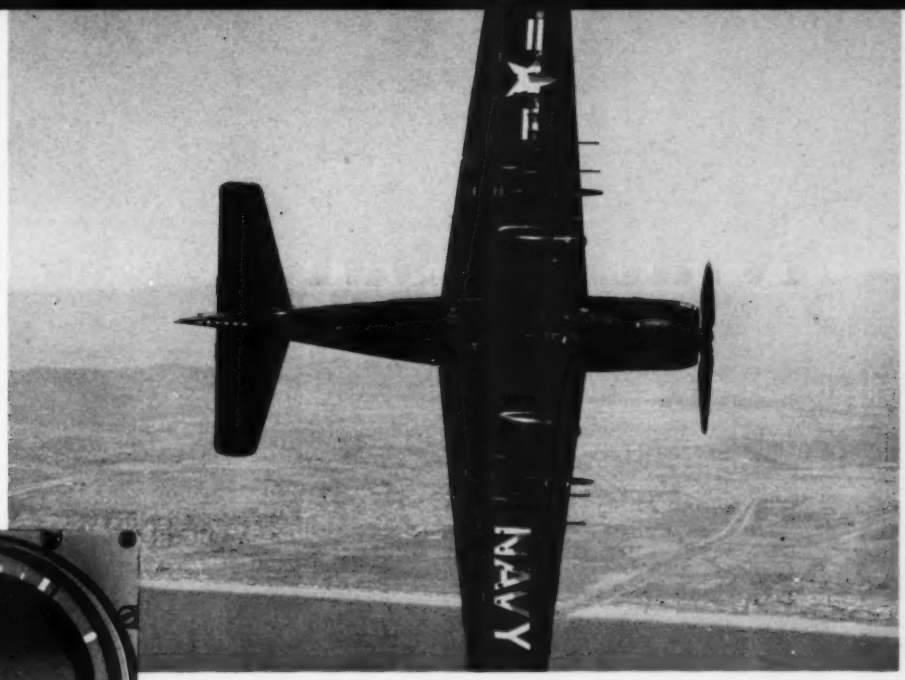
The major cause of vertical gyro error is aircraft turn. The net acceleration sensed by the ball erector mechanism results from a combination of gravity plus the centrifugal acceleration of the turn (G). Combination of these two forces establishes a "dynamic vertical" force which, in a coordinated turn is perpendicular to the lateral axis of the airplane.

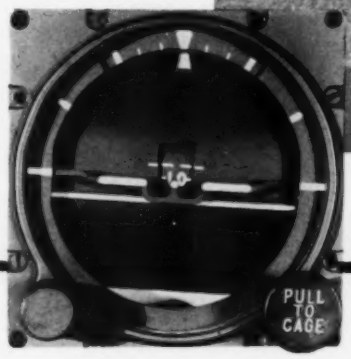
Without going into detail, it may be said that this force acts to resist the normal attempt of the instrument to return to a true indication. A similar example of this action may be observed in the lag precession of the instrument in a normal, but slow turn. Probably not generally known is the fact that the more shallow the bank, the greater the resulting error when the factor of longer time in the turn permits the error to increase.

In this respect, pilots are reminded that during GCA approaches, standard rate turns are a *must* if precession is to be held to a minimum.

At the completion of a half-Cuban-eight, displacement of the horizon bar up to 15 degrees in pitch and/or bank may result. The amount of the error will depend upon the G loading of the gyro, the precision with which the maneuver is flown, the rate of rotation and the condition of the instrument. The indicator will immediately begin to correct this error at a rate of about two to three degrees per minute, once true gravitational forces are sensed.

It should be noted that any attempt by the pilot to eliminate the error at the completion of the maneuver, by pulling the manual caging knob is a dangerous procedure un-





less the airplane is known to be in straight and level flight by visual reference.

In at least two instances, where recovery was made into haze or into an overcast, the airplane was observed to reappear in disoriented attitude which produced a progressive stall from which no recovery was effected.

For this reason, pilots engaging in this type of maneuver are urged to practice, repeatedly, at a safe altitude, the maneuver to the point of a complete understanding of just what to expect in the way of gyro-horizon error.

Thorough instrument training accomplished in accordance with standard squadron doctrine and monitored by a chase plane, will pay valuable dividends in precision instrument flying and vastly increased confidence.

It should almost go without saying that under such conditions, of aerobatic maneuvers on instruments, the pilot should never neglect the value of needle-ball-airspeed. •

Table of typical errors for non-tumbling gyro-horizons after half-Cuban-eight maneuvers:

	SPERRY		*PIONEER*	
Type Indicator	**H-6**	**H-6D**	**J-8**	**P-1**
Max. Roll	− 5°	− 9°	− 8°	−15°
Max. Pitch Error	− 9°	−10°	+ or − 12°	+ 8°
Avg. Roll Error	− 1°	− 3°	+4°	+ 3°
Avg. Pitch Error	+3°	−3°	− 4°	−15°

− Roll in left wing down **+ Pitch is climb indicated**
+ Roll is right wing down **− Pitch is dive indicated**

Aviation Safety Award Winners

Winners of the 1955 *Chief of Naval Operations Aviation Safety Award* will be honored soon. At that time engraved bronze plaques will be presented each of the winning organizations and ships, in recognition of their outstanding aviation safety performance in fiscal 1955.

For further details on the activities of the CNO award winners in fiscal 1955 operations, watch for the December issue of the *Approach*.

In the meantime, hearty congratulations to the winners, who are:

COMAIRLANT

Marine Photographic Squadron TWO

Attack Squadron ONE HUNDRED FOUR

Marine Helicopter Transport Squadron TWO HUNDRED SIXTY-THREE

Patrol Squadron SEVEN

Patrol Squadron FIVE

USS RANDOLPH (CVA-15)

COMAIRPAC

Fighter Squadron ONE HUNDRED FOURTEEN

Fighter Squadron ONE HUNDRED FIFTY-ONE

Attack Squadron ONE HUNDRED FIFTEEN

Marine Helicopter Transport Squadron THREE HUNDRED SIXTY-THREE

Patrol Squadron ONE

USS WASP (CVA-18)

CNARESTRA

VMF-213, NAS Los Alamitos, California

VF-692, NAS Columbus, Ohio

VP-921, NAS St. Louis, Missouri

Safety Council Notes, which normally appear on this page, are omitted this month in order to include the winner of the 1955 Chief of Naval Operations Aviation Safety Award. Watch for Safety Council Notes in your November issue of the *Approach*.

Aero-Medical

Top medical talent is working hard to lick the problem. Meanwhile here's the latest on how to combat the

noise that annoys

IT'S no news that aviation has made tremendous progress in recent years, and that airplanes are flying higher and faster than ever before. To those in naval aviation it is equally apparent that this increase in aircraft performance has been accompanied by a proportionate growth in noise associated with aircraft operation. This problem of noise has become so important that a number of intensive and continuing studies have been initiated.

For those who are daily exposed to the screeching blast of jet engines, who have visions of eardrum callouses and a growing sensitivity to hearing aid advertisements, a discussion of these relatively new problems of noise should prove interesting.

Except perhaps for the unknown individual who posed the question of "what noise annoys an oyster?" the study of varying effects of sound, frequencies and vibration was largely limited to industrial tests of the finish and assembly of certain products. Now, the prime objective has become the determination of the annoyance value of noise, and here are some of the results of that research.

Decibels Measure Din

Three factors must be considered when discussing noise, namely intensity, frequency and the length of exposure. The intensity of noise is measured in decibels, which may be considered the rating of a sound with respect to its effect on the human ear. For example, an ordinary conversation, political arguments and readyroom bull sessions excepted of course, would register about 50 decibels. The horn of the auto immediately behind you, the one that blows during the split second that the light changes from red to green, would measure about 90 decibels.

An average person exposed to 90 decibels for six to eight hours will show a slight hearing loss which will return to normal in about an hour if the noise is removed. However, the degree of hearing loss increases as the time of exposure or the intensity increases. Thus exposure for a long period to 120 or 130 decibels, which is roughly equivalent to the noise produced by a jet fighter in a low pass over the field, will cause a drastic hearing loss which may not return to normal for several days or even weeks following removal of the noise.

Again frequent repeated exposure to such noise over a period of several years will cause some permanent hearing loss. Land-based units normally will not be subject to this to the extent experienced during shipboard operations. Incorporation of afterburner operation adds to the problem.

Painful to Hear

An engine with afterburner may reach an intensity in excess of 150 decibels, and a flight deck crewman operating in the vicinity of a catapulting jet may be repeatedly exposed to this high noise level. In this situation the flight deck man, whose personal hearing sensitivity might flinch at anything but the finest in hi-fi record players, can expect any variation of the following reactions.

About 140 decibels will produce a sensation of pain in the ear. Above 140 decibels, strange phenomena occur. These vary with individuals, but may include jiggling of the eyeballs which blurs vision, and a vibration of the teeth and skull. Some individuals quickly develop a generalized feeling of weakness and may complain of inability to concentrate. The accuracy of the sense of touch may be markedly reduced.

Any of these symptoms could have serious effects on a member of the flight deck crew whose alertness and dexterity is essential to safe carrier operations.

Fortunately, recovery from these effects of short-time exposure to noise of this intensity is generally rapid and complete when the noise stops. However, there may be some after effects such as earache, ringing sounds, headache, excessive fatigue, general lassitude, irritability and, of course, a prolonged hearing loss.

Now, before you begin pricing ear trumpets and computing disability compensation, it should be understood at this point that a great deal may be done to reduce these effects. Be assured that, with proper employment of adequate measures now available you will neither become occupationally punchy, nor are you unnecessarily liable to cauliflowered eardrums.

Three Ways to Insulate

There are three ways to reduce the effects of high intensity noise. One would be to insulate the source of sound. Naturally you cannot cover the engine and any muffler

presently under consideration involves an unacceptable power loss. Second, you could insulate the immediate environment of the person—this is done for the pilot by insulating the cockpit—but obviously is very restricted in its employment otherwise. The third and most important way to reduce these effects is to insulate the person.

Since most of the sound enters the body through the ears, they are the only parts which must be insulated. This may be done by covering the entire ear with an insulated cup. This technique is currently being evaluated on carriers, using flight deck sound reduction helmets.

The most feasible answer to the problem is found in a method to block the external auditory canal. Of course you could stick your fingers in your ears, but this is unsatisfactory because it is tiresome and makes it impossible to work in this position. You could also stuff cotton in your ears, and this procedure has been followed for many years by aviators and members of gun crews.

But cotton has certain disadvantages in that it is difficult to place properly and comfortably and is hard to remove completely. But the primary objection is that cotton affords only limited protection from noise. That leaves only one practicable solution to the noise problem—ear plugs.

Plugs Aid Voice Reception

The Navy uses several types of ear plugs which are considered superior for their purpose to commercial products. One of the best is the V-51R ear defender or ear warden. These plugs are available under Stock No. 37P-292-250. They will reduce the intensity of jet engine noise by about 20 decibels. *Perhaps even more impressive is the demonstrated quality of these plugs for improving the hearing of speech in high noise level areas.* This factor is the result of the lessening of intensity without altering the speech-to-noise ratio, and can be likened to the use of sun glasses to reduce glare.

The most important function of the ear plugs however, is the prevention of considerable hearing loss due to exposure to loud noise. This means that the men on the flight deck will be able better to hear directions and warnings and will probably not feel the fatigue and irritability so common with exposure to loud noise.

Fortunately, the protective helmet worn by pilots furnishes adequate insulation for them. However, ear plugs should not be worn with protective helmets because removal would be difficult in single place aircraft.

Hints for Hearing

Recommended though, is the use of ear plugs by pilots who do not wear these helmets, such as patrol plane and transport pilots. While ear plugs are being used the following precautions must be exercised:

1. Remove ear plugs when in a normal, quiet situation. This is important because although plugs improve the hearing of speech in loud noise areas and prevent hearing loss, the opposite result is true when they are worn in quiet areas. Here the ear plugs actually decrease the hearing of speech. Again, the analogy of sun glasses being worn in semi-darkened areas applies.

2. Keep the ear plugs clean. Introducing a tight fitting object into the ear can be dangerous unless it is properly done and the plug is scrupulously clean. Plain old soap and water are effective and recommended for cleaning the ear plugs. To keep the plugs clean, carry them in the plastic carrying case when not in use.

3. Insure that the right size of ear plugs is used. This is important both for good protection from noise and for a comfortable fit. It may be that one ear will need a large size plug and the other ear a medi-

um size plug. The issue of plugs may sometimes be a haphazard procedure, so, to be sure, have your flight surgeon fit them for you.

4. Finally, a thoughtful operations or division officer will consider that exposure to jet engine noise is not limited to those who work closely with the aircraft, but that others are also subject to the same effects. In surveying *your* unit or activity, remember that the man who drives the fuel truck, or who operates an auxiliary power unit and similarly employed individuals may require noise protection too.

Ear Plugs Will Protect

The professional members of the naval aviation family—pilots, aircrewmen, ground personnel, carrier personnel—will regard the matter of noise with proper respect. They will recognize that noise may not be treated as just another problem incidental to the operation of jets.

Bear in mind that the same powerful forces associated with sonic booms or mach knock are present in degree in ground operation of aircraft. Prolonged exposure to noise causes inefficiency, and in flight operations, inefficiency assumes a dangerous quality. So, earmark this information and protect your ears against noise, or you'll be hearing LESS . . . LESS . . . less . . . ●

With or without afterburners, the noise level of today's jets poses a problem for maintenance and operating personnel, especially aboard carriers.

Flight deck crews and line mechanics need to know the various temporary symptoms of excessive noise.

Prediction: WARM AND DRY—If you wear the Mark IV Exposure Suit. Without it that water can get . . . .

Cool, Man, Cool!

An icy ditching, but the pilot was unharmed by exposure.

TEMPERATURE of the water was 35° F., air temperature 32° F. The pilot, after ditching his aircraft, was in these freezing surroundings for a period of 18 minutes. After being rescued from the icy sea by a helicopter, the pilot had experienced no harmful effects from exposure due to the protection afforded by the Mark IV anti-exposure suit.

The anti-exposure suit has the capability of protecting against exposure at freezing temperatures for a period of one hour, and this period may even be extended if the head is kept warm. However, the job

Test your anti-exposure suit, and inspect it frequently. When you take care of it, it will do the same for you.

of defense against frigid temperatures can only take place if the pilot has his anti-exposure suit in good condition.

Correct procedure in dressing and undressing in the anti-exposure suit, proper maintenance and frequent vigilant inspections of the suit are the three keys to proper care. One of the reasons for damage of heavy wear can be attributed to the constant dressing and undressing, and this wear may be greatly minimized by following proper procedures outlined in ACSEB 35-54.

Hang 'Em Right

An aircraft carrier in its combat action report stated: "It is also noted that if the suits are hung in a designated area instead of just anywhere in the readyrooms, there is less likelihood of tears resulting from being carelessly thrown around." The exposure suit should be hung on its hanger in a cool, well ventilated place. However, it should never be stored where sunlight is likely to get at it. Proper and frequent cleaning of the exposure suit is an additional means of protecting against damage. Neck and wrist seals should be washed and dried after each wearing. The inner-liners are to be dry cleaned and *not* washed. However, when such a method is not available, the "hand-wet-cleaning" method may be substituted. This method is fully explained in ACSEB 36-54 and should also be reviewed.

It is extremely important to constantly check the water-tight integrity of the anti-exposure suits. Special attention on these inspections should be given to the non-fabric areas. The wrist and neck seals, because of their constant stretching, should be carefully noted for tears. In the new Mark IV anti-exposure suits, adequate repair materials and repair kits are provided. However, major repairs are *not* to be attempted.

Applying ingenuity will result in a method to inspect the suits. One method employed metal engine shipping containers. These were filled with water and set up on the hangar deck. A chain fall was used to simulate a helicopter sling. This not only afforded the pilots an opportuntiy to check their exposure suits, but also gave them practical experience in getting into the sling. This procedure was well received by all pilots.

Cotton summer flight clothing is frequently worn over exposure suits to protect the suits from tears. Such wintertime wear, when personnel may be near fires for warmth, makes it important that this summer equipment be regularly treated to retard fire.

If your flight clothing was originally procured subsequent to June 1953, you can stop here. Specifications now provide for a durable type of fire retardent treatment.

Clothing obtained before that time must be re-treated after each washing to remain protective. And *you* may not melt in the rain, but your fire-retardment can, so a soaking also calls for a re-treatment.

Personnel who launder the suits should follow this procedure or else. Or else someone may burn for it!

Re-treat

Before application of the treatment remove all grease spots from garments, in regular washing operations plus a spot cleaning if necessary. After laundering damp-dry the flight clothing and then immerse completely in six gallons of water containing 2 lbs. borax, 1½ lbs. boric acid, and 1½ lbs. diammonium phosphate. The garment should then be agitated in this witch's brew for approximately 10 minutes at a solution temperature of 100° F. Damp-dry again and then hang up to air dry. If pressing is desired, this should be accomplished at the damp-dry stage. However, care should be exercised to prevent prolonged exposure to mangles or irons up to 250°. The quantities given are for one garment.

If careful consideration is given to the proper use, maintenance and inspection of the anti-exposure suit and other flight gear, the confidence of knowing you possess a safe piece of survival equipment is the result—take care of it and it will take care of you. •

Hang up suits in a designated area instead of just anywhere in the readyrooms.

Individual experimentation with flight equipment can be dangerous . . .

HOW *NOT* TO DO IT YOURSELF

A CURRENT activity of Mister Average Citizen, which has recently attained considerable prominence in family circles, is the rapidly growing do-it-yourself fad of making things at home. Encouraged, no doubt, by power-tool manufacturers, this urge of the American male to engage in home construction projects has wrought minor marvels of suburban carpentry—and littered countless households with the unfinished products of basement genius.

Now, while this form of build-it-at-home philosophy is most laudable, the application of the idea to certain phases of naval aviation promises to prove disturbing.

A recent aircraft accident report indicates that quite possibly, this pleasant, if rather uncertain practice of do-it-yourself, has intruded into the realm of aviation equipment. Granted that individual initiative is a commendable virtue, it is suggested that these amateur artisans of aviator articles might exercise more restraint in their improvement projects—or be painfully discouraged with the results.

For example, maybe you're one of these free-lance fabricators with, say, an egg-shaped head which doesn't fit too perfectly in any of the several helmet shapes offered by the flight clothing issue room. Be hesitant about redesigning your brainbucket to some custom-fit model which might be a paragon of comfort, but a devilishly hard contraption to keep on your head.

Or if you chafe, literally, at the apparent droop-drape shape of the exposure suit, and fret over the fitted tightness of the collar and wrist cuffs, lay those scissors down, Mac, there's a reason. The Navy spent numerous dollars developing this particular rig to give you the optimum in comfort *vs* effectiveness, and it's entirely possible that any gadgeteering on your part might well compromise the equipment. The same advice applies to all of your flight and survival equipment, and you can be sure that the problem of further improvement is a continuing study in several fields of research.

A case in point is cited wherein a gent recently was forced to ditch when the engine lost power. This pilot succeeded in putting the airplane into the drink very nicely. This wasn't his first experience! However, our friend had seen fit to alter the standard helmet-liner attachment in such a way that the impact of the aircraft with the water knocked off the helmet. He was able to get out of the cockpit with no strain, but as the plane sank, the tail assembly bashed him on the head. Fortunately, it was a glancing blow and the pilot was not knocked unconscious, and he was able to continue the process of getting out of his harness, inflating his pararaft and getting aboard to await rescue.

Helmets should only be modified in accordance with the latest technical orders (T. O. 126-52; redesignated ACSEB 20-54).

Without offering further examples, let's just leave the reminder that, if you have any good ideas on improving or modifying the equipment issued you, don't experiment. There are lots of folks whose job it is to evaluate and prove any such recommendations under controlled conditions. Appropriate equipment desks at BuAer will be pleased to receive comment and suggestions — *everybody*, including you will be much happier for having changes made this way rather than through the dubious method of individual experimentation.

So remember, guinea pigs are considered more or less expendable—you aren't! •

It takes a tired pilot longer to calculate corrections. In high performance aircraft the increased reaction time may not be available. Get your rack time regularly.

Rest Cure

"I BELIEVE if I had been thoroughly rested the accident would have not occurred." No one disagrees with this pilot's analysis of his accident, but it is better to say, "I believe I need a thorough rest so an accident will not occur."

You can't take a tablet or jug of joe in place of your eight hours sleep anymore than you can drop a tablet in a fuel tank to replace an overhaul. The pilot is also a complex machine system who needs maintenance time.

The accident mentioned above was a barrier crash and noseup in an F9F-5. It was charged to pilot error but the error was not so much in having the accident as in taking the flight. On arrival over the ship the pilot said, "I was very tired and anxious to get aboard and get some rest. I did not feel as alert as I should have and was physically as well as mentally tired." He dived for the deck, bounced and went into the barrier. "Just didn't seem to have the 'feel'," he commented.

In 23 hours this pilot had flown five hops for a total of 5.6 hours. The remainder of the time was used in waiting for launch, waiting for weather—which was marginal, getting in and out of flight gear, briefings and debriefings. *At the time of the accident he had slept only three hours in the last 24 and only seven hours in the last 48. It had been 18 hours since his last full meal.*

On one landing ashore he had requested dexedrine. The flight surgeon quite properly refused, offering to ground the pilot instead. The offer was rejected, as the pilot was anxious to complete his Car-Quals and this flight would have day-qualified him. So he flew—into a barrier and an Aircraft Accident Report.

On the same day three other pilots had about the same amount of sleep, with a correspondingly lowered efficiency. These pilots were grounded by their flight surgeon.

Lack of sleep is as bad as a hangover. Concentration is reduced and forgetfullness increases or you may just plain "pull a boner." For example, the pilot who worked all night and went flying the next morning with near-disasterous results. After flying for several hours he made a careful downwind pattern and on final "wondered why those stupid pilots were taking off toward him." The errors of coordination and judgement are killers and they aren't usually recognized until too late.

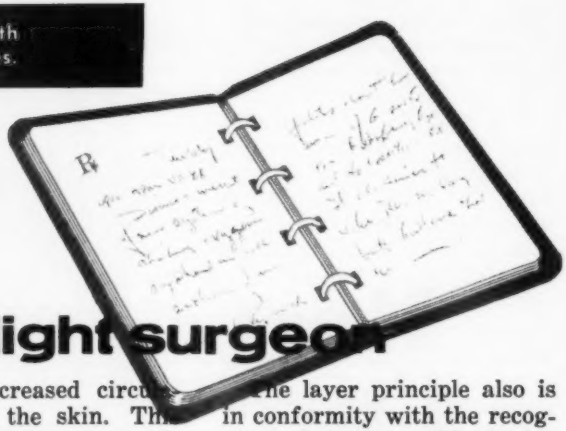
Tired pilots take longer to calculate corrections and in high performance aircraft the increased reaction time may be fatal.

The pilot is the first to know when his orbs are too heavy for orbitting. It is much more pleasant to see your flight surgeon in his office than to face him as the member of an accident board.

Instead of a pick-me-up, ask your flight surgeon for a check-me-up. •

Operations in very cold weather bring forth old enemies in new and more dangerous guises.

NOTES



from your flight surgeon

CARBON MONOXIDE—The familiar carbon monoxide bogie is a particular friend of Old Man Winter, because personnel trying to shut out chilling ventilation from outside air are inviting carbon monoxide to come in. Even small sources may build up to toxic levels in closed living spaces, vehicles, and generator rooms. Carbon monoxide can smother you before the danger is realized.

AVIATION GASOLINE—Aviation gasoline remains a fire hazard in cold weather conditions, and also becomes a potentiating factor in frost bite because of its high rate of evaporation. Flesh will freeze in a few seconds after contact with aviation gasoline in subzero weather.

NICOTINE—Nicotine, recognized as an enemy of good night vision and a source of carbon monoxide, also causes the blood vessels close to the skin to constrict, which means that fingers, toes and skin surfaces, deprived of the heat carried by the blood, will freeze more easily.

ALCOHOL—Alcohol has the opposite effect from nicotine. It causes an increased circu[illegible]tion close to the skin. Th[illegible] gives a temporary well-known, feeling of warmth, but unfortunately, this does not mean that it can be recommended. Body heat brought to the surface of the body is quickly lost. In such a case, there is the greater danger of generalized cold injury, or that perspiration may be induced which aids frostbite.

ANOXIA—Anoxia, even at altitudes where the blood is still 80 percent saturated with oxygen, causes the surface blood vessels to contract, which may account in part for the rapidity with which frostbite occurs at high altitudes.

CLOTHING—The first law of keeping warm is to keep dry. Water conducts heat 23 times better than air—wet or damp clothing conducts heat faster than dry clothing—avoid perspiration.

So, to keep comfortably warm, the word is not to overdress. This advice is more easily heeded if you follow the layer principle. Several layers of clothing allow for adding some when relaxing and removing some when heavy exercise produces more heat. [illegible]he layer principle also is in conformity with the recognized fact that still air between layers of clothing is an excellent insulator. Effective outer clothing should be windproof and should allow for closing the waist, collar and cuffs securely to preserve the layers of still air. However, all garments should be loose enough to avoid constriction over the joints, shoulders, elbows, knees. Such constriction, besides displacing the insulating air, limits blood circulation to the skin, inviting discomfort and frostbite.

Shoes are particularly important and must not be tight. They should be enough larger than your usual size to allow for two or three pairs of socks. However, it is preferable to wear only one pair of socks than to have tight shoes. Feet must be kept dry by frequent changes of socks.

Feet and hands are the parts of the body most difficult to keep warm. No entirely satisfactory hand covering has been found because of the conflicting needs of warmth and delicate touch but the layer principle still applies when practicable. ●

Maintenance

Utilize some positive means to prevent ground crews from slipping off wings.

Install covers after the engines have cooled.

Low temperatures make for low availability unless you apply a high degree of pre-planning for winter . . .

Cold Thawts!

WITH the advent of cold weather and below freezing temperatures mechanics begin to realize that the problems arising from aircraft maintenance in frigid climates get rough. You've probably already read "Cold War" in the flight operations section of this issue. It creates a hypothetical situation a squadron might find itself in. With the stage thus set The *Approach* presents a collection of cold weather maintenance facts and common sense gathered from many sources. The cold, cold story continues with a script for ground crews which might go something like this:

"The flight deck bullhorn growled the new recovery time and pace of preparations accelerated with only the usual vocal reaction.

"Ya push 'em forward and ya push 'em aft —danged if I ain't wore out the seat of my britches slipping on this deck! If . . ."

"Ahh shaddup! If you'd put those flight deck soles on like the man said you wouldn't have such a rough time! Bear a hand!"

"Lookit those hands! 'nother minute and the'd frozen stiff—I tell ya . . ."

"Hah! You just didn't believe what they were talking about when they told you about spilling gas on your hands in cold weather!"

There's little doubt that this dialogue and situation would have been tempered considerably had these men been briefed thoroughly and outfitted for cold weather ops.

Personal Care

The problems concerning personal care and equipment are most important and cannot be overlooked in the slightest detail. Experience has proven that work performed by mechanics on aircraft without shelter or heat tends to be of low quality. The time taken in erecting shelters providing heat is not wasted.

At times, of course, maintenance must be done outside of hangars. This requires fixed or portable shelters. These should be procured now. But heat is necessary for these too—have you a sufficient supply of heaters?

Proper winter clothing is necessary for both effective ground and air operations. Its issue and care should be stressed. Of particular significance is the danger of spilling electrolyte on parka or mitts when handling aircraft batteries. Acid in the electrolyte burns holes which reduce their protective quality.

Use of Isopropyl

Isopropyl is a mighty handy winter helper—do you have plenty on hand?

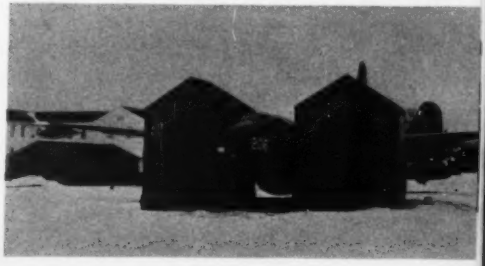
Use of a defrosting substance is an absolute necessity in winter operations. Generally speaking, the fluid must be sprayed on the wings within four hours before takeoff or its value is lost. Isopropyl is effective against all but a thick coating of snow.

Before spraying snow-covered wings with isopropyl, it is best to sweep the wings with brooms. This is necessary because the defrosting substance with snow forms a sort of paste that is hard to remove. Despite the fact that isopropyl is not designed to remove ice, it will in time. As the ice dissolves and cracks, it is necessary to remove the ice with brooms.

Curved windshields are more prone to frost.

The battery in some planes is located so as not to be included during the engine preheating.

Shelters increase maintenance quality.



Cold Thawts (*Continued*)

Snow Removal Precautions

The lowly broom comes into its own with cold weather. Be sure to have plenty of them around. How about your other snow removal equipment? in shape? enough? Review your snow removal plans—see "Snow Job," page 41.

Protective covers should be installed over a completely clean and dry surface. They are the best protection against frost, freezing rain and falling snow. However, protective covers and plugs should not be installed until the airplane and engine have cooled.

Aircraft parked on snow or ice can develop a high static charge during snow removal. Before refueling the recommended procedure is to ground the aircraft electrically and wait at least 30 minutes for the charge on rubber and plastic parts leak off.

When cleaning the surfaces of an aircraft by heating, always be certain the melted ice and snow is wiped off before refreezing occurs. Here too, is the ever-present danger of condensation in the interior of the airplane. When there has been a light blowing of snow, wings and fuselage sections in the vicinity of any openings should be inspected before take-off for accumulated snow. Light snow can sift through the smallest openings. It's wise also to take precautions to prevent ground crews from slipping and falling off wings when de-icing!

Landing gear doors, speed brakes and arresting gear equipment should be retracted when the aircraft is parked.

To prevent tires from freezing to the ice, use wrapping paper, canvas, wood or foliage under each tire. Should tires freeze to ice, free by heating with a portable heater. Flat spots on the tire may become frozen in. Normal towing should roll out these flat spots, but if this fails slow heating of the tires will remedy the condition.

When ice or snow interfere tow and push the airplane backward so that the main gear takes the load and prevents damage to the nose gear shock strut; otherwise, excessive stress on the strut may later cause leakage around seals.

Hydraulic as well as pneumatic and propeller seals have a tendency to leak during cold weather. Corrective action should be taken when leaks are discovered. However, small leaks or seepage will usually disappear when the temperature increases.

If chocks are not available for shore-based aircraft, sand-bags or mounds of packed snow can be used. Exercise special care when turning up engines on snow and ice surfaces as chocks may not prevent the aircraft from slipping.

Don't use the parking brakes if they are wet. Subsequent freezing will make the release of the brakes impossible.

Since the taxiing of aircraft is held to a minimum due to ice and snow cover on the airfield, adequate tugs and tractors should be on hand to move aircraft. To aid traction, have plenty of sand on hand.

(Below) Don't operate electrical equipment without external power attached. (Right) It's best to sweep the wings with brooms.

Windshield and Canopy Care

Acrylic plastic canopies require particular attention. If the airplane is to be moved from a heated area to an unheated area or vice-versa, open the canopy enough for air circulation to prevent the uneven temperatures from cracking or crazing the plastic.

In many cases, frost on the outside of the windshield will have to be removed manually. One of the most efficient means is scraping with a plastic putty knife, which may be made within the activity. Curved windshields are more prone to frost than flat types.

Never apply any anti-icing fluids that contain solvents or solvent derivatives to the windshield and canopy.

When preheating the cockpit before flight, avoid sudden blasts of hot air on the windshield from the anti-icing system.

Battery and Electrical Problems

The output of a storage battery may be less than 50 percent if its temperature is sub-zero. Consequently, one may believe the battery is discharged. The battery in some planes is located as not to be included during the engine preheating. Slow heating to 40°F or less restores the necessary output to turn the starter. Placing a cold charged battery on a charging circuit restores its efficiency by warming the elements as well as interrupting the sulphation process. Beware of rapid heating by internal means.

The battery should always be kept fully charged to prevent freezing of the electrolyte. *Do not operate electrical equipment, including the opening and closing of the canopy, without external power attached.*

Under extremely cold weather, flight instruments may be unreliable because of bearing friction caused by congealed lubricants. Electrically operated instruments are normally more reliable than vacuum operated instruments during cold weather operations.

Fuel System Hazard

Water condensation in cold weather can seal fuel tank air vents by freezing them shut. If the vents are closed, no fuel can flow from the tanks. During extremely cold weather, condensation of moisture in oil and fuel tanks requires frequent draining of the pumps.

On all aircraft that have combustion type heaters, the fuel filter in the heater line should be checked daily for the accumulation of ice or water.

Engine Difficulties

Some of the difficulties associated with the operation and maintenance of aircraft engines in low temperatures are discussed as follows:

Don't overprime. Overpriming results in fires, scuffed cylinders and engine failure.

Moisture also forms quickly on sparkplugs during cold starts. If three or four starting attempts are unsuccessful, remove one plug from each cylinder and heat until they are comfortably warm to the hand.

(Left) Prevent tires from freezing to the ice. (Below) Have you a sufficient supply of heaters? (Right) Install protective covers over clean, dry surfaces.

Cold Thawts *(Continued)*

Short periods of ground running should be avoided. If the engine is not brought up to operating temperatures, the water vapor in the products of combustion that escape past the piston will condense inside the crankcase and will be distributed throughout the oil system. This may produce split coolers, choke lines or possible engine failure.

Oil Dilution Technique

If for any reason an engine is given a series of short ground runs during cold weather, the operator should keep in mind that short runs do not boil off the diluent but they do mix the diluted oil in the short system, (hopper tank) with the undiluted oil in the tank body. If the engine is diluted after each short run, all of the oil in the system becomes heavily diluted. The first sign of trouble is overflowing of the oil caused by the addition of several gallons of gasoline to the oil. The second difficulty is the excessive time required to boil off the diluent. Therefore, avoid short runs.

Of particular note concerning oil dilution is a report concerning accidents occurring to three transports in the Alaskan area. An extensive investigation determined the causes of the accidents to be engine failures due to improper engine lubrication. Oil dilution, anticipating sub-zero temperatures, which diluted only the hopper tank, left the main tank oil congealed. Warm-ups and preflight checks were normal. However, little or no preheat was applied to the engine and none to the oil tanks. After 15 to 45 minutes of flight, loss of oil pressure, loss of propeller control and inability to feather the propeller was experienced. Investigation showed that due to the congealed state of the engine oil in the main tank only the hopper tank (short system) oil of about six gallons was available for use. This was exhausted after a short time causing engine failure finally.

Snow creates additional ground hazards too.

When oil is drained for preheating use caution in handling; covered cans are desirable. If you are servicing more than one plane, use a separate can for each plane—then if any metal is found in any can there can be no question as to which plane it came from.

Congealed grease or oil in engine and aircraft controls, especially the housed shaft type, may make them immovable during very cold weather. Clean them and use a lighter lubricant. Throttles should be left in the partially open position after shutting down. This will permit starting if the engine controls become too stiff to move and may prevent freezing of the butterfly.

Jet Engine Freeze

The turbine buckets of jet engines have been known to freeze due to small amounts of water being present in close tolerance areas. When this occurs the use of an external heater becomes necessary. Heat need be applied only for few minutes.

In summation, the points listed here are far from being all-inclusive of cold weather know-how (a list of references for cold weather information is on the back cover). However, these pointers will, if remembered and followed, do much to lessen the burden of maintaining your aircraft under the coldest of conditions. ●

Removal of the white stuff must take top priority

Snow Job!

MODERN aircraft with their increased ability to cope with winter flying hazards have made the safe maintenance of runways in snow areas a major item in cold weather flight operations. Removal of the white stuff must take top priority if ground facilities are to equal aircraft capabilities.

Snow removal is at best a defensive measure. Prior and positive planning is the only way to overcome Ole Man Winter's attack. Lack of a prepared snow removal plan will increase the number of hours required to remove the snow, with a concurrent endangering of lives, aircraft and an unnecessary reduction of operational effectiveness.

Key figure in any snow removal plan is the operations officer. Various other organizations are assigned particular duties and areas of responsibilities under the operations officer. These organizations must be prepared to execute their portion of the snow removal plan with efficiency and speed; the two ingredients of effective snow removal.

Snow Plan Items

When snow is imminent four separate categories of the snow removal plan must be ready to function on call. These are: storm warnings, equipment, manpower and snow removal priorities.

Storm warnings and weather reports are obviously the responsibility of aerology. Before the storm and at regular intervals during any storm period the following information should be furnished: Anticipated time of storm, estimated duration, expected depth of snow and prevailing wind direction.

Snow removal equipment should be checked for operating condition. If possible, equipment should be in heated buildings to facilitate easy starting in below zero weather. Spare parts should be stocked prior to cold weather.

Repair and overhaul of snow removal equipment should be done during warm months. It should be steam-cleaned, painted and all moving parts processed for extended storage. Tires should be lifted off the floor. Lights must be in good operating condition.

Manpower Assignment

Manpower availability may vary but will probably include both civilian and military personnel. Snow removal personnel, whether civilian or military, should be assigned in a semi-permanent manner and should receive prior assignment to equipment including familiarization with their duties.

Men and equipment should be available on a 24-hour basis during the storm season. A duty schedule containing the name of each

Snow Job *(Continued)*

operator, type of equipment he is checked out in, and where he may be contacted will assist in mobilizing ready crews.

The snow removal plan should include a definite method of operations, with a breakdown for each runway, taxiway, parking area and ramp. First priority on snow removal must be given to one selected runway and all access ways to this runway.

Wind direction and velocity, GCA capability, approach lights, length and obstructions normally will determine which runway is to be cleared first. After one runway and its taxiways are open, work can begin on others in order of priority.

Planned ways to plow pavement intersections and carry snow to spoil areas are desirable. Designated final disposal areas for dump truck operations should be firmed up.

Supervisory personnel on the field should operate from radio-equipped vehicles and be in a position to warn snow removal personnel to clear the working areas in emergency.

Field Operations

All pilots landing or taking off should report surface conditions of ramps, runways and taxiways. Aircraft ground operations and takeoffs should be scheduled so as to interfere as little as possible with the snow removal crews.

If blowing snow has been a problem in the past, well placed snow fences may be a simple work-saving solution. Aerology may be able to assist in planning proper placement.

In actual snow removal it is important to keep ahead of the snowfall if possible. An early beginning is necessary because a four-inch depth is considered maximum by some for aircraft operation in the continental U. S. Most airports begin removal when the depth reaches two inches. After the initial pass by snow plows, light trucks fitted with blades may be used for residual clean-up if traffic conditions permit.

The entire runway plus adequate shoulders must be cleared. Care must be taken to insure that snowbanks near the runway do not extend to a height which would cause aircraft damage. At intersections the windrows resulting from sweeping one runway are edged by blades back into the cleared areas.

Snow Markings

An important attendant factor in snow removal is adequate marking of runways, taxiway and ramp areas. Liberal use should be made of warning flags or light in caution areas. Runway marking also gives the landing pilots a reference point in conditions where perspective may be lost. Flags along the edges can be used. Another system for marking employs dye marker sprayed on the snow. The dye is mixed in the following solution: five parts water, five parts dye, one part alcohol. The solution is placed under air pressure in a 55-gallon drum for use.

In summary, the essential elements of a successful snow removal are:

- A carefully prepared, definite and practical plan.
- Prior understanding of duties by all personnel involved.
- Equipment, including refueling trucks, prepared for immediate use.
- Placing of trained operators and helpers on an alert status.
- Trained, experienced and efficient supervisors and teams available at all times.
- Maintenance men on the job with spare parts readily accessible. This should include electricians and radio personnel. ●

Prior and positive planning is the only way to overcome Ole Man Winter's attack. For operational effectiveness and successful snow removal it is important to keep ahead of the snowfall if at all possible.

From The Ground Up

Damage was minimized by arresting gear. Maintenance could have prevented this TRIAL BY ERROR accident.

TRIAL BY ERROR—Due to a lack of readily available drop-check facilities and constant high operational demand for aircraft a landing gear drop-check was omitted on an AF2S after a hydraulic swivel valve change. As a result an incorrectly labeled valve was installed and the error went undetected until after this accident.

After takeoff the pilot attempted to raise his wheels. Only the port gear raised. Upon recycling the gear the starboard gear raised but the port gear went down. After cycling the gear several times with the same results the emergency air system was used. Again the port gear went down and the starboard up.

The pilot was instructed to break the hydraulic line leading to the canopy bypass valve. After lowering his flaps and extending the tailhook the pilot cut the line with his knife. The hydraulic pressure dropped and the starboard wheel went down but would not lock even after several applications of G force. Some two hours later the plane was landed using the runway arresting gear. It rode to a stop on the port gear and the starboard radar pod. Only the pod was damaged.

Investigation revealed that the assembly used was identical in outward appearance to a landing gear hydraulic swivel valve. It bore the manufacturer's part number for a landing gear swivel valve and further, was packed and stocked as such. However, the assembly was actually a bombbay hydraulic swivel valve, the internal routing of which is different than that of a landing gear swivel valve.

The accident board recommended that in any case where parts with similar of identical external appearance have a different function, rating or capacity, they be tested where possible rather than relying solely on identification markings; and in any event that regardless of working conditions, schedules and commitments, safe and positive maintenance procedures such as the drop-check be cautiously and conscientiously adhered to. ●

BUST-OUT—Freezing weather caused 4000 gallons of fuel to escape from a gas truck at northern air station last winter. Despite precautionary practices of draining gas truck sumps twice daily to check for the presence of water in the fuel, water trapped in the pump escaped detection.

During the night this water froze, caused the pump to burst and permitted the fuel to run freely on the ground. This fire hazard was discovered by smell in time to prevent a major fire.

Technical Order 47-50, which applies to all Navy refueling vehicles used for fueling of aircraft with gasoline or jet type fuels, outlines the correct procedures to insure the re-

FROM THE GROUND UP, *(Continued)*

moval of water from a gas truck pumping system. It is quoted here in part: "Place the discharge hose in the tank manhole and circulate not less than 50 gallons of fuel through the pumping system. If a discharge of water from the separator is noted, continue to circulate until the discharge ceases." ●

ELECTROLYTIC ACTION—When the port landing gear of a JRF-6 would not retract the pilot made a precautionary landing and the port landing gear collapsed after a short rollout.

It was determined that the failure of the landing gear operating torque tube was the cause of the accident. This was a result of intergrannular corrosion from the inside of the tube outward caused by elecrolytic action of two dissimilar metals. Steel pins had been used in the place of aluminum to secure the flange coupling.

Investigation revealed that the aircraft had operated out of an overseas base for about a year where fresh water hose-downs were conducted *infrequently*. After its acceptance by the reporting activity many small parts in the landing gear assemblies had to be replaced because of extensive corrosion.

The accident board said the primary contributory factor causing this accident was the lack of comprehensive and searching inspection of every component part of the landing gear assembly upon acceptance and subsequent major inspections. It recommended that the landing gear torque tubes be inspected for corrosion every 120 hours and any steel pins found be replaced with 17 ST aluminum rivets. ●

Improper assembly of the landing gear of the JRF caused ELECTROLYTIC ACTION and a damaging accident.

FLUID LOSS CAUSES TOTAL LOSS—The loss of power control hydraulic fluid and a subsequent loss of flight control caused the pilot of a *Cutlass* to abandon it at about 4000 feet. The aircraft crashed and burned resulting in strike damage loss amounting to more than a million dollars. The pilot, upon ejecting, left his seat without difficulty and parachuted to the ground. He sustained minor injuries.

On invesigation it was determined that the fluid loss resulted from material failure in either the port power control hydraulic lines, fittings or pressure micro-switches which activate the port power control pump low-pressure warning lights.

Maintenance records indicated that on the day prior to the accident the aircraft required one half gallon of fluid to fill each power control system and just prior to the last flight one gallon of fluid was used to fill No. 2 power control system. The capacity of each system is 7½ gallons which includes 1½ gallons in each reservoir. This usage was considered excess of normal but on neither occasion was there any visual signs of system leaks. Investigators reasoned that the leakage could have been contained in the centerline rocket pod.

A policy concerning the amount of fluid use before maintenance inspection is required had not been established by the squadron concerned nor was a postflight check of power control reservoirs for fluid required. As a result the accident board made the following recommendations: that all *Cutlass* squadrons institute a postflight as well as a preflight check for fluid level in the power control system reservoirs in order to detect in-flight and ground fluid losses; that a comprehensive record be maintained of fluid requirements and thoroughly investigate all instances of excessive fluid usage; and, that the hydraulic lines leading to the pressure sensing switches either be rerouted or replaced with flexible lines. (It was pointed out that lines, as presently installed, have been a predominant source of fluid leakage in the power control systems). ●

the Tip-tank

Miscellaneous aviation safety information

LOOK BEFORE YOU LEAP

An AD-5 experienced a rough engine followed by muffled explosions, fire and subsequent drop in fuel pressure. When the fire became too intense to effect a safe landing the pilot ordered the crew to bail out.

The observer in the rear seat had considerable difficulty in jettisoning his canopy. He finally accomplished this by laying on his back and kicking the canopy off.

Pilots are cautioned that this condition can develop when their canopy is extended to the aft position prior to the rear canopy being jettisoned. A pressure differential is created that prevents breakaway of the observer's canopy.

DILUTE CORRECTLY

Oil dilution's the right solution to cold weather engine operation if carried out properly. Follow the correct procedure every 30-50 hours, generally diluting oil by 10 percent at 20-40° F, 20 percent at zero to 20° F.

HARD HATS FOR HELICOPTERS

Helicopter pilots may and should draw protective helmets from Flight Gear Issue on presentation of their log books. It is apparent from the large number of head injuries occurring in minor helicopter accidents, that pilots have not been taking advantage of this opportunity. Head injuries will be reduced considerably when these helmets are used.

It is also recommended that a pool of helmets be maintained by the squadron for issue to crew members and passengers. Types H1, H3 and H4 are available and satisfactory for use in 'copters.

AVIATION SAFETY OFFICERS:

Ever make a wheels-up landing at a field not equipped with a runway signalman? Or better, were you ever prevented from making a wheels-up landing by the action of a runway signalman?

The *Approach* is considering a program of emphasis on the important role of the wheel watch in aircraft accident prevention, including appropriate recognition of individuals whose alertness and timely action have resulted in positive savings in dollars and equipment.

Station and squadron aviation safety officers are invited to submit comment and suggestions as how this program may best be developed. Drop a note to the *Approach* using any Anymouse form. Ideas on other fields to exploit? Let's hear from you. ●

STOP!

Each copy of the *Approach* is intended for at least 12 readers, including pilots, flight surgeons, aviation maintenance, and servicing and supporting personnel. Please pass this copy along.

Know-how is the only answer in meeting Old Man Winter on even terms. Get the jump on him this year by cracking the books early.

Cold Weather Information Reference Sources:

Aviation Safety Bulletin 24-54

Technical Note:

83-42 Operating and Maintenance information on Herman Nelson aircraft engine and shelter heaters

18-49 Turbo-jet engine icing

16-51 Instruments; Oil Pressure Gages, cold weather operation of

38-52 Instructions for Cold Weather Operation of Naval aircraft

23-53 Ice and frost on exterior surfaces of aircraft; fluid for removal and prevention of

Technical Order:

34-52 De-icing fluids, use of

36-49 Use of carburetor heat

Aviation Clothing and Survival Equipment Bulletins (ACSEBs):

6-54 Electrically heated flying suits—Inspection of internal lead wires

35-54 Suits, flying exposure, Mk IV and Mk III (modified) Instructions for wearing

36-54 Suits, flying, anti-exposure, Mk IV and Mk III (modified) Instructions for fitting

36a-54 Suits, flying, anti-exposure Mk IV and Mk III (modified) Instructions

40-54 Suits, anti-exposure, Mk III and Mk IV, alternate methods for wearing

45-54 Mark IV anti-exposure flying suit; Modification and repair of insulation liner

46-54 Suits, anti-exposure; quick-donning for aviation personnel

OpNav Instr 3710.12 (Sept 1952) Ice formation on aircraft

Sense Pamphlets: NavA 00-80Q-11 Aleutians Sense; - 13 Arctic Sense; - 31 Carrier Cold Weather Sense.

General Training Publication: NavA 00-80T-32 Polar Guide; -37 All-Weather Flight Manual; **NavA 00-80Q-1** Ice formation on aircraft.

Cold Weather Training Films:

FA7923	How to Use Cold Weather Clothing
MA2627	Land and Live in the Arctic
6659	Task Force Williwaw
6661	Exercise Musk Ox
6667	Task Force Frigid
6803	Exercise Yukon
6948	Survival on Arctic Tundra
6965	Summer Movements in the Arctic
7450	General Effects of Cold on Man
7491	Cold Weather Training, Indoctrination and Survival
9282	Cold Weather Uniforms
MB5394	Exercise Eskimo
5395	Exercise Polar Bear
MC6376	The Secret Land
MN2644	Cold Weather Operations of Aircraft
6666	Canadian Arctic Operation
6772	Cold Weather Operating Problems
6912b	Navy Sierra Snow Test
7419a	Ships, Men and Ice
7458b	Mark IV Exposure Suit
7478	Ski Jump No. II
7491	Cold Weather Training, Indoctrination and Survival
7818	Survival in the Aleutians